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Notice of Allowability	Application No.	Applicant(s)	
	10/803,475	CUNNINGHAM, JAMES A.	
	Examiner	Art Unit	
	Stephen W. Smoot	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to applicant's amendment filed on 08 September 2005.
2. ☒ The allowed claim(s) is/are 1-4, 7-10, 12, 15 and 16.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>9-8-05</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

Stephen W. Smoot

Stephen W. Smoot
Patent Examiner
Art Unit 2813

This Office action is in response to applicant's amendment filed on 08 September 2005.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below to clarify that the filing date of the provisional application is May 27, 2003 because the provisional application papers filed on March 18, 2003 did not include drawings, which were later filed on May 27, 2003. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

In the Specification:

In paragraph [0001], lines 2-3, change "March 18, 2003" to --May 27, 2003--.

2. Claims 1-4, 7-10, 12, 15-16 are allowed.
3. The following is an examiner's statement of reasons for allowance:

- Claims 1-4 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, an integrated circuit that includes a cap layer comprising metal on a first conductive region comprising copper within a trench, combined with a via over the first conductive region and through the cap layer, wherein an alloy seed layer comprising copper is over a conductive diffusion barrier layer on sidewalls of the via and wherein the alloy seed layer is in contact with the first conductive region;
- Claim 7 is allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, an integrated circuit that includes a cap layer comprising at least one of palladium and platinum on a first conductive region comprising copper within a trench, combined with a via over the first conductive region and through the cap layer, wherein an alloy seed layer comprising copper and at least one of tantalum, molybdenum, chromium, and tungsten is over a third diffusion barrier on sidewalls of a via and the alloy seed layer is in contact with the first conductive region;
- Claims 8-10, 12 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, an integrated circuit that includes a cap layer comprising at least one of palladium and platinum on a first conductive region comprising copper within a first trench, combined with a first diffusion barrier over via and second trench sidewalls corresponding to a dual damascene opening and combined with a second diffusion barrier over

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horizontal surfaces of the second trench opening, wherein the first diffusion barrier and the second diffusion barrier are different materials; and

- Claims 15-16 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, an integrated circuit that includes a diffusion barrier/cap layer comprising a metal and a conductive oxide of the metal over a first conductive region comprising copper within a trench, combined with a layer of silver and a layer of palladium between the diffusion barrier/cap layer and the first conductive region.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS